DRAFT working document for discussion only -- May 24, 2012

MAPPING STANDARDS for the Delta Aquatic Resources Inventory

Classification

The Delta Aquatic Resources Inventory (DARI) classification is an expanded version of the classification used in the Bay Area Aquatic Resources Inventory (BAARI) to include aquatic types distinct to the Sacramento San Joaquin Delta. The DARI typology is summarized below.

Code	***Name***	***Cowardin Code***
TC	Tidal channel (Tidal Riverine channel?)	R1UB,E1UB?
TV	Tidal vegetation (Tidal Riverine veg?)	PEM/PSS/PFO
GPOW	Lagoon open water	
GPV	Lagoon perennial vegetation	
GPUF	Lagoon perennial unvegetated flat	
DOW	Depressional open water	PUB
DV	Depressional vegetation	PEM, PSS, PFO
FW (SN?)	Farmed wetlands (flat seep?)	PEM, PSS, PFO
LOW	Lacustrine open water	L1 UB
LV	Lacustrine vegetation	L2AB, PEM,PSS,PFO
POW	Playa open water	PUB2E
PV	Playa vegetation	PEMJ
PU	Playa unvegetated	PUB2E
FOW	Fluvial open water	R2UB, R4SB
FV	Fluvial vegetation	PEM, PSS, PFO
VP	Vernal pool	PEM1C/A
VPC	Vernal pool complex	PEM1C/A/U
SU	Seep unnatural-levee seep	PEM/PSS/PFO

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Natural and Unnatural Wetlands

Natural wetlands are wetlands that would exist in the same general configuration without any human interaction and are not man-made. Unnatural wetlands exist because of human modification of the landscape. If the open water portion is unnatural than all associated vegetation is also unnatural. The modification to the landscape can be intentional, in the case of stock ponds and agricultural ditches, or unintentional, in the case of water gathering at the edge of a road. Unnatural features can be modified natural features. These features become unnatural when their wetland functions are degraded. For example, engineered channels are unnatural because its natural counterpart would have provided increased wildlife habitat, sediment controls, flood protection, and other functions. Though there are some exceptions to

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this rule. For example, reservoirs can increase wildlife habitat and provide flood protection but because they are man-made they are unnatural. Features are labeled natural (N) or unnatural/man-made (U), which is always the last character designation of the code (e.g. PUU refers to Playa Unvegetated Unnatural).

Tidal and Semi-tidal Waters and Wetlands

Tidal Channel (TC): Tidally influenced channels; most (all?) of the project area has salinity of less than 0.5 ppt.

Tidal Vegetated (TV): areas with greater than 10% vascular vegetation cover that exists below the high tide line, commonly referred to as marsh plain. Tidal marsh is vegetated wetland that is subject to tidal action. It occurs throughout much of the Delta from the lowest extent of vascular vegetation to the top of the intertidal zone (at the maximum height of the tides).

Tidal Ditch (TD): unnatural, man-made ways to convey tidal water or runoff within tidal wetlands and other baylands. Ditches are usually much straighter than channels.

Figure 1. Tidal wetlands and waters

Lagoon (G): impoundments of water subject to at least occasional or sporadic connection to full or muted tidal action. They can receive tidal action seasonally (S) or perennially (P) depending on management or natural cycles. Lagoons can consist of three habitat areas: open water (OW), unvegetated flat (UF), and vegetated (V). They can also be natural (N) or unnatural (U). Natural features can occur due to barrier beaches or dunes whereas unnatural features are modified with levees with tide gates. For the most part Lagoons in our project area will be perennial and unnatural (GPOWU, GPUFU, GPVU).

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Figure 2. Muted tidal lagoon

Non-tidal Wetlands

The non-tidal wetlands consist of all of the wetlands that are not influenced by tidal movements. Most non-tidal wetlands consist of two habitat elements: open water (OW) and vegetated (V). Open water habitat features are areas that have at least 75% percent open water and are contiguous without gaps of 10 meters along the edge. Vegetated habitat features are areas with at least 25% cover of vegetation. A third habitat type, unvegetated (U), is only used in playas. These are areas without standing water during the dry season, less than five percent vegetation cover and usually occur adjacent to open water areas. All these habitat features can be natural (N) or unnatural/man-made (U).

Fluvial channel (FC): Non-tidal channel usually with some sinuosity.

Figure 3. Fluvial channel

Fluvial vegetation (FV): Wetland vegetation occurring (rooted?) below the ordinary high water mark of a fluvial channel or ditch.

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Fluvial ditch (FD): Constructed channel, usually straight. Mapped with line down center then buffered with width. Culverts mapped as ditch with 0 meter width.

Figure 4. Ditch with associated vegetation is mapped with line and assigned a buffer based on ditch width. The oaks are not within the ditch and are at a higher elevation. Because they are not within the channel and are not inundated by water, they are non-wetland riparian vegetation and should not be mapped.

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Lacustrine Wetlands (L): Wetlands with areas of open water equal to or greater than 20 acres. Natural lacustrine features (lakes) maintain their size during typical rainfall years where unnatural features (reservoirs) may shrink due to water management. In addition to size, lacustrine features have an average depth of at least 6 feet during the dry season. Lakes are comprised of two parts; the area of open water (OW) that is apparent during the wet season and the area of wetland vegetation (V) that borders the open water area. These wetlands can also be naturally formed (N) or man-made (U). The vegetated portion of the lacustrine wetland can abut to wet meadows. Lacustrine vegetation occurs within a lake basin and differs from wet meadows in that they mainly owe their wetness to high water levels of the adjoining lake. This vegetated area does not have an upper size limit; it just has to be hydrologically dependent on the open water feature.

Figure x . Lacustrine open water and vegetation

Depressional Wetlands (D): Exist in topographic lows that may or may not have outgoing surface drainage. Precipitation, overland flow and groundwater are their main sources of water. Depressional wetlands have a minimum size of 0.025 acres (100 square meters). They can have prominent areas of shallow or seasonally open water (OW) and areas of adjacent vegetation (V). These features can be natural (N) or unnatural (U). The open water areas include unvegetated flat areas that are seasonally flooded and do not support more than 10 percent vegetation. The open water portion differs from lacustrine wetlands by being smaller than 20 acres in area and having an average depth less than 6 feet during the dry season. The vegetated portion can support woody wetland vegetation (e.g., willows and alders) and herbaceous wetland plants (e.g., sedges and rushes). This vegetated area does not have an upper size limit, but is hydrologically dependent on the open water feature.

Seeps and Springs (S): A form of slope wetland, they form due to seasonal or perennial emergence of groundwater into the root zone and in some cases onto the ground surface. They usually form on hillsides or along the base of hills or alluvial fans, etc. They can lack well-defined channels. Slope wetlands are greater than 0.025 acres (100 square meters) and less than 0.5 acres (~2,000 square meters). They also can consist of both woody wetland vegetation (e.g., willows and alders) and herbaceous wetland plants (e.g., sedges and rushes). Seeps and springs can be natural (N) or unnatural (U). Unnatural seeps would occur because of human modifications to the landscape. Water seeping out the downslope portion of a stock pond would be an unnatural seep.

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Figure 6. Seep and depressional wetlands

Farmed Wetlands (FW): **Flat Seep?** **W**etlands that persist in farmed areas. These wetlands exist due to persistent groundwater and wetland plant growth. They must exist in at least two of the imagery datasets. The wetland should be digitized based on the most recent image where the wetland signature is discernible.

Use the color signature relative to the surrounding area. Farmed wetlands will differ from their surrounding environment. They will be brown (evidence of oversaturation) while the surrounding areas are green or, this can also be the reverse, where farmed wetland will be green (evidence of saturation) while the surrounding area is brown. Make sure the area is not caused by varying irrigation practices; some fields are irrigated pastures which look like wetlands. Examine similar fields in the area. These are areas that are clearly not farmed due to saturation. Varying color of crops should not be mapped. Areas should not be mapped if they have been hydrologically modified (drainage ditches constructed) in 2010 and no longer show a wetland signature.

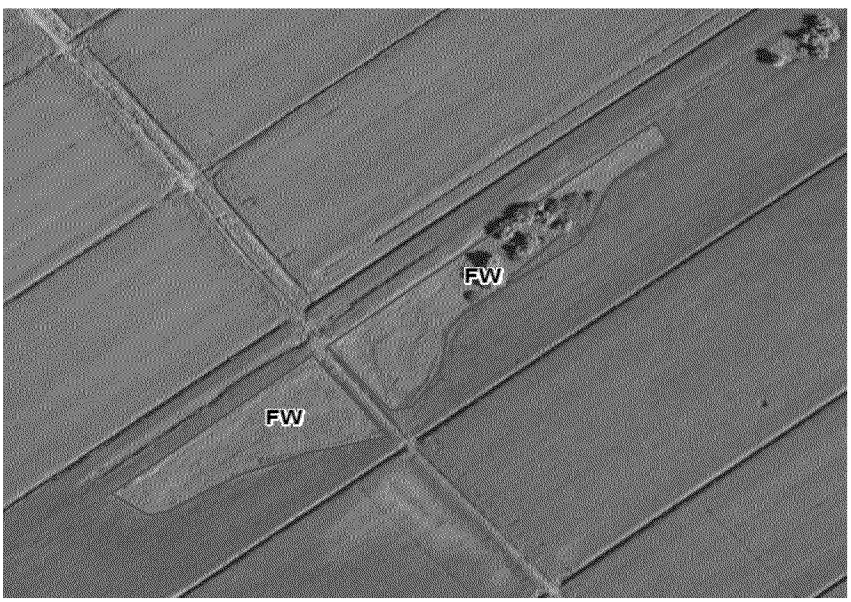

Figure 7. Farmed wetlands--seeps in agricultural fields.

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Levee Slope Unnatural (SU) is an area of at least 500 m^2 (about 3 oaks size) that is densely covered with shrubs and/or trees and that exists along the out-board base or the in-board base of a levee. The vegetation size should be considered as an area of canopy coverage greater than 80% with gaps of less than 10m. If a there is a gap greater than 10m between trees separate out the two patches and make sure they are larger than the minimum mapping unit. Areas on the out-board side of a levee that are probably higher in elevation than the usual high water mark of the tidal waters or that are probably higher than the frequent (1-5 year) riverine high water events should not be mapped as wetlands; these areas are non-wetland riparian areas. Similarly, areas on the in-board side of a levee that are likely to be higher in elevation than leakage are seepage through the levee should not be mapped as wetlands; these areas are non-wetland riparian areas. To map the expected or likely extent of these SU areas, only map the canopy of the first line of trees or dense shrubs overlapping the base of the levee or adjoining it on the uphill surface of the levee. Furthermore, no polygon of wetlands on the out-board side of the levee should include areas that differ in elevation by more than 2 meters. In other words, use elevation information to reduce the risk of mapping as wetlands any areas that are too high to be significantly influenced by high tides or frequent flooding. Areas of oak and other trees that lack any likely source of surface water, other than purposeful irrigation, and that are associated with buildings or other structures should be regarded as landscaping and should not be mapped as wetlands.

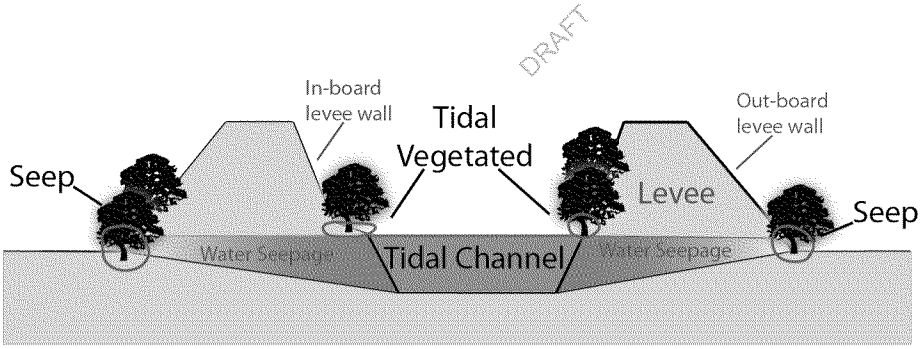

Figure 8. Diagram of levee slope seeps.

Figure 9. Riparian along a levee, NAIP 2010

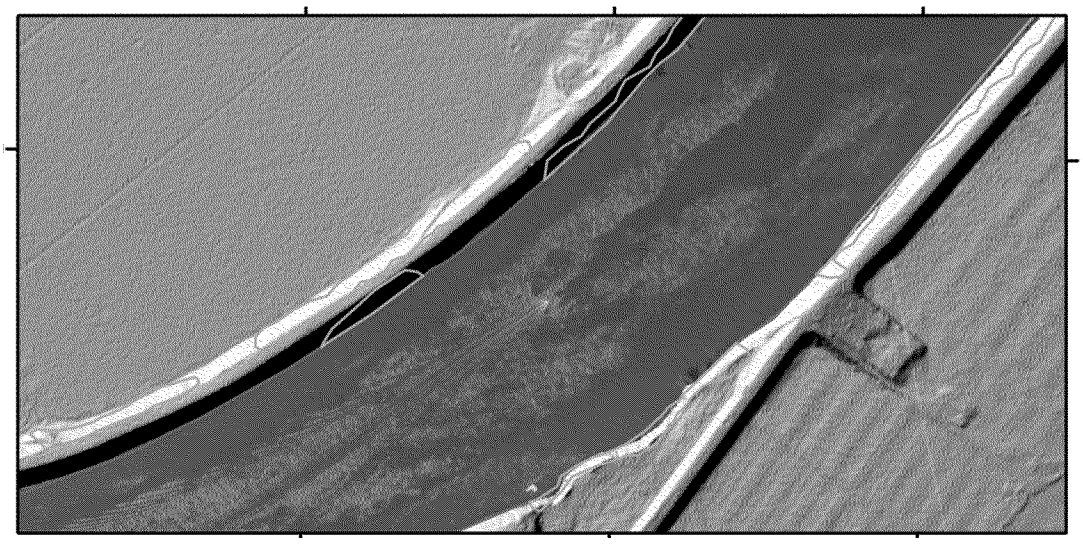

Figure 10. Riparian along a levee, LiDAR hillshade

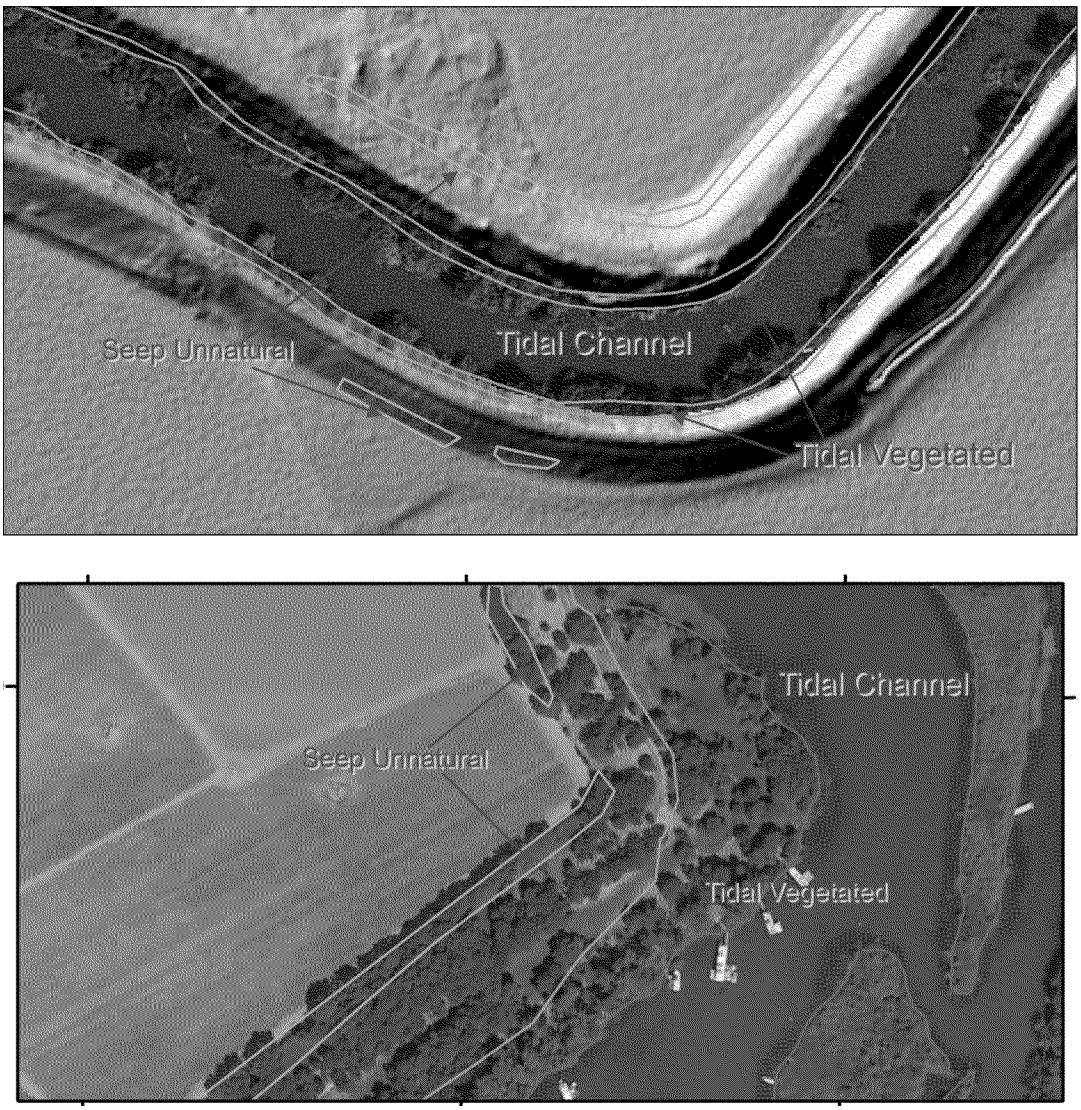

Figure 11. A very narrow band of vegetation along the in-board side of the levee was mapped to capture the wetland vegetation at the base of levee. For this the canopy was not mapped but an estimation of the first 2 meters of elevation above water level.

Playas (P) are nearly level, shallow, ephemeral (seasonal) or perennial, sodic (i.e., strongly alkaline) or saline water bodies with very fine-grain sediments of clays and silts. Unlike vernal pools, playas have little or no vascular vegetation within the limits of the water body, though they support sparse peripheral vegetation. Playas can consist of open water (OW), associated vegetation (V) and unvegetated areas without standing water (U). These features can be either natural (N) or human modified (U). Unlike lacustrine wetlands, playas are less than 6 ft deep during the wet season, although they can be hundreds of acres in size.

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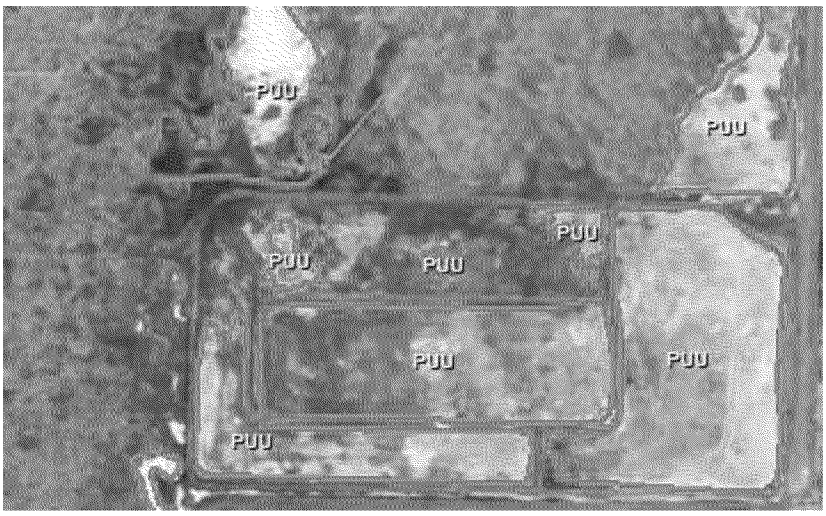

Figure 12. Playas

Vernal Pools (VP): a special kind of seasonal depressional wetland having bedrock or an impervious soil horizon close to the surface and supporting a unique vernal pool flora. These depressions fill with rainwater and runoff from small catchment areas during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season. Vernal pools often occur together with vernal swales as vernal pool systems that have many pools of various sizes and shapes, varying floral and faunal composition, and various hydroperiods. Water can move between adjacent pools and swales through the thin soils above the underlying impervious substrate. Individual vernal pools (VP) are mapped at maximum water volume.

Vernal Pool Complex (VPC): several vernal pools that are hydrologically interconnected are mapped as one unit.

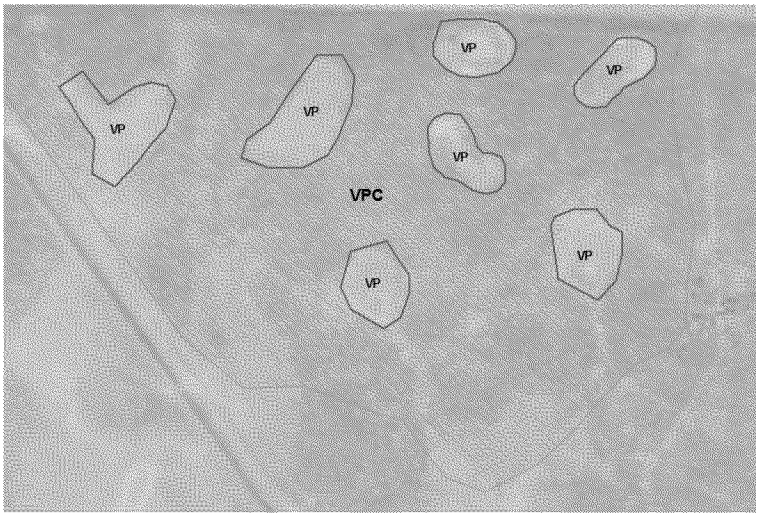

Figure 13. Vernal pools and vernal pool complex

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